

**Amendments to the Claims:**

This listing of claims will replace all prior versions, and listings, of claims in the application:

**Listing of Claims:**

1           **Claim 1 (currently amended):**     A multiband data  
2     communication apparatus which receives signals by switching  
3     a plurality of frequency bands in response to a band  
4     switching signal, said multiband data communication  
5     apparatus comprising:  
6           quadrature demodulating means for converting either a  
7     reception signal or a reception intermediate frequency  
8     signal into a quadrature reception baseband signal, said  
9     quadrature demodulating means including:  
10          a pair of first quadrature mixers for converting  
11     either the reception signal or the reception intermediate  
12     frequency signal into a reception baseband signal;  
13          local oscillating means for producing a local  
14     oscillation signal; and  
15          phase shifting means for inputting said band switching  
16     signal and for shifting a phase of said local oscillation  
17     signal based upon said band switching signal to thereby  
18     supply the phase-shifted local oscillation signal to one or  
19     both of said pair of first quadrature mixers; wherein  
20          said local oscillation signal is provided to another  
21     of said pair of first quadrature mixers with a phase  
22     shifted or not shifted without regard to said band  
23     switching signal.

24           **Claim 2 (currently amended):**    A multiband data  
25   communication apparatus which transmits signals by  
26   switching a plurality of frequency band in response to a  
27   band switching signal, said multiband data communication  
28   apparatus comprising:

29           quadrature modulating means for converting a  
30   quadrature transmission baseband signal into either a  
31   transmission signal or a transmission intermediate  
32   frequency signal, said quadrature modulating means  
33   including:

34           a pair of second quadrature mixers for converting a  
35   transmission baseband signal into either the transmission  
36   signal or the transmission intermediate frequency signal;

37           local oscillating means for producing a local  
38   oscillation signal; and

39           phase shifting means for inputting said band switching  
40   signal and for shifting a phase of said local oscillation  
41   signal based upon said band switching signal to thereby  
42   supply the phase-shifted local oscillation signal to one ~~or~~  
43   ~~both~~ of said pair of second quadrature mixers; wherein

44           said local oscillation signal is provided to another  
45   of said pair of first quadrature mixers with a phase  
46   shifted or not shifted without regard to said band  
47   switching signal.

1           **Claim 3 (previously presented):**    A multiband data  
2   communication apparatus comprising:

3           quadrature modulating means for converting a  
4           quadrature transmission baseband signal into either a  
5           transmission signal or a transmission intermediate  
6           frequency signal;

7           quadrature demodulating means for converting either a  
8           reception signal or a reception intermediate frequency  
9           signal into a quadrature reception baseband signal; and

10          local oscillation signal producing means for supplying  
11          a local oscillation signal to both said quadrature  
12          modulating means and said quadrature demodulating means,  
13          for transmitting/receiving by switching a plurality of  
14          frequency bands in response to a band switching signal,

15          wherein said quadrature demodulating means includes a  
16          pair of first quadrature mixers for converting either the  
17          reception signal or the reception intermediate frequency  
18          signal into a reception baseband signal; and wherein

19          said quadrature modulating means includes a pair of  
20          second quadrature mixers for converting a transmission  
21          baseband signal into either the transmission signal or the  
22          transmission intermediate frequency signal; and further  
23          wherein

24          said local oscillation signal producing means includes  
25          local oscillating means for producing a local oscillation  
26          signal, and said apparatus further comprises

27          phase shifting means for shifting a phase of said  
28          local oscillation signal based upon said band switching  
29          signal to thereby supply the phase-shifted local  
30          oscillation signal to one or both of said pair of first

31 quadrature mixers and to one or both of said pair of second  
32 quadrature mixers.

1           **Claim 4 (previously presented):** A multiband data  
2 communication apparatus as claimed in claim 3, wherein  
3 said phase shifting means supplies a signal obtained by  
4 shifting the phase of said local oscillation signal by  $\pi/2$   
5 to one of said pair of first quadrature mixers and one of  
6 said pair of second quadrature mixers, while said phase  
7 shifting means supplies one of said local oscillation  
8 signal and a signal obtained by inverting a code of said  
9 local oscillation signal to the other of said pair of first  
10 quadrature mixers and to the other of said pair of second  
11 quadrature mixers in response to said band switching  
12 signal.

1           **Claim 5 (previously presented):** A multiband data  
2 communication apparatus as claimed in claim 3, wherein said  
3 phase shifting means supplies said local oscillation signal  
4 to one of said pair of first quadrature mixers and to one  
5 of said pair of second quadrature mixers; while said phase  
6 shifting means supplies one of a signal obtained by  
7 shifting the phase of said local oscillation signal by  $\pi/2$   
8 and a signal obtained by shifting the phase of said local  
9 oscillation signal by  $\pi/2$  and by then inverting said phase-  
10 shifted local oscillation signal to the other mixer of said  
11 pair of first quadrature mixers and also to the other mixer

12 of said pair of second quadrature mixers in response to  
13 said band switching signal.

1       **Claim 6 (previously presented):** A multiband data  
2 communication apparatus as claimed in claim 3, wherein said  
3 phase shifting means supplies said local oscillation signal  
4 to one of said pair of first quadrature mixers and to one  
5 of said pair of second quadrature mixers, while said phase  
6 shifting means supplies one of a signal obtained by  
7 delaying the phase of said local oscillation signal by  $\pi/2$   
8 and a signal obtained by advancing the phase of said local  
9 oscillation signal by  $\pi/2$  to the other of said pair of  
10 first quadrature mixers and also to the other of said pair  
11 of second quadrature mixers in response to said band  
12 switching signal.

1       **Claim 7 (previously presented):** A multiband data  
2 communication apparatus which receives signals by switching  
3 a plurality of frequency bands in response to a band  
4 switching signal, said multiband data communication  
5 apparatus comprising:

6       quadrature demodulating means for converting either a  
7 reception signal or a reception intermediate frequency  
8 signal into quadrature reception baseband signal, said  
9 quadrature demodulating means including:

10       a pair of first quadrature mixers for converting  
11 either the reception signal or the reception intermediate  
12 frequency signal into a reception baseband signal;

13           storage means for saving thereinto discrete data a  
14 frequency pattern component functioning as a base;  
15           address generating means for generating an address  
16 every preselected clock;  
17           phase shift means for adding a predetermined number  
18 based upon said band switching signal to said address;  
19           first analog converting means for analog-converting  
20 data which is read out by addressing said storage means  
21 based on the address outputted from said address generating  
22 means to thereby supply the analog-converted data to one of  
23 said pair of first quadrature mixers; and  
24           second analog converting means for analog-converting  
25 data which is read out by addressing said storage means  
26 based on the output of said phase shift means to thereby  
27 supply the analog-converted data to the other of said pair  
28 of first quadrature mixers.

1           **Claim 8 (previously presented):** A multiband data  
2 communication apparatus which transmits signals by  
3 switching a plurality of frequency band in response to a  
4 band switching signal, said multiband data communication  
5 apparatus comprising:  
6           quadrature modulating means for converting a  
7 quadrature transmission baseband signal into either a  
8 transmission signal or a transmission intermediate  
9 frequency signal, said quadrature modulating means  
10 including:

11           a pair of second quadrature mixers for converting a  
12   transmission baseband signal into either the transmission  
13   signal or the transmission intermediate frequency signal;  
14           storage means for saving therein discrete data of a  
15   frequency pattern component functioning as a base address  
16   generating means for generating an address every  
17   preselected clock;  
18           phase shift means for adding a predetermined number  
19   based upon said band switching signal to said address;  
20           first analog converting means for analog-converting  
21   data which is read out by addressing said storage means  
22   based on the address outputted from said address generating  
23   means to thereby supply the analog-converted data to one of  
24   said pair of second quadrature mixers; and  
25           second analog converting means for analog-converting  
26   data which is read out by addressing said storage means  
27   based on the output of said phase shift means to thereby  
28   supply the analog-converted data to the other of said pair  
29   of second quadrature mixers.

1           **Claim 9 (previously presented):**   A multiband data  
2   communication apparatus comprising:

3           quadrature modulating means for converting a  
4   quadrature transmission baseband signal into either a  
5   transmission signal or a transmission intermediate  
6   frequency signal;

7           quadrature demodulating means for converting either a  
8   reception signal or a reception intermediate frequency  
9   signal into a quadrature reception baseband signal; and

10          local signal producing means for supplying a local  
11   oscillation signal to both said quadrature modulating means  
12   and said quadrature demodulating means, for transmitting/  
13   receiving by switching a plurality of frequency bands in  
14   response to a band switching signal, wherein

15          said quadrature demodulating means includes a pair of  
16   first quadrature mixers for converting either the reception  
17   signal or the reception intermediate frequency signal into  
18   a reception baseband signal; and further wherein

19          said quadrature modulating means includes a pair of  
20   second quadrature mixers for converting a transmission  
21   baseband signal into either the transmission signal or the  
22   transmission intermediate frequency signal; and still  
23   further wherein

24          said local oscillation signal producing means includes  
25   storage means for saving thereinto discrete data of a  
26   frequency pattern component functioning as a base; address  
27   generating means for generating an address every  
28   preselected clock; phase shift means for adding a  
29   predetermined number based upon said band switching signal  
30   to said address; first analog converting means for analog-  
31   converting data which is read out by addressing said  
32   storage means based on the address outputted from said  
33   address generating means to thereby supply the analog-  
34   converted data to one of said pair of first quadrature



35 mixers; and second analog converting means for analog-  
36 converting data which is read out by addressing said  
37 storage means based on the output of said phase shift means  
38 to thereby supply the analog-converted data to the other of  
39 said pair of first quadrature mixers.

1       **Claim 10 (previously presented):** A multiband data  
2 communication apparatus as claimed in claim 9, wherein  
3 either said quadrature modulating means or said local  
4 oscillation signal producing means includes clock  
5 generating means for generating a clock signal and interval  
6 determining means for determining a clock interval used to  
7 read out data from said storage means so as to control the  
8 address generating operation of said address generating  
9 means.

1       **Claim 11 (currently amended):** A communication method  
2 of a multiband data communication apparatus including  
3 quadrature demodulating means for converting either a  
4 reception signal or a reception intermediate frequency  
5 signal into a quadrature reception baseband signal, for  
6 receiving by switching a plurality of frequency bands in  
7 response to a band switching signal, said communication  
8 method comprising the steps of:

9       producing a local oscillation signal;  
10       providing said band switching signal to a means for  
11 shifting a phase for controlling said means for shifting a  
12 phase; and

13           using said means for shifting a phase for shifting a  
14   phase of said local oscillation signal in response to said  
15   band switching signal to thereby supply the phase-shifted  
16   local oscillation signal to a first quadrature mixer for  
17   converting either the reception signal or the reception  
18   intermediate frequency signal into a reception baseband  
19   signal; and

20           providing said local oscillation signal, with said  
21   phase shifted or not shifted without regard to said band  
22   switching signal, to a second quadrature mixer, also for  
23   converting either the reception signal or the reception  
24   intermediate frequency signal into a reception baseband  
25   signal.

1           **Claim 12 (currently amended):** A communication method  
2   of a multiband data communication apparatus including  
3   quadrature modulating means for converting a quadrature  
4   transmission baseband signal into either a transmission  
5   signal or a transmission intermediate frequency signal, for  
6   transmitting by switching a plurality of frequency band in  
7   response to a band switching signal, said communication  
8   method comprising the steps of:

9           producing a local oscillation signal;  
10          providing said band switching signal to a means for  
11   shifting a phase for controlling said means for shifting a  
12   phase;

13       providing said local oscillation signal, with said  
14       phase shifted or not shifted without regard to said band  
15       switching signal, to a first quadrature mixer; and  
16       using said means for shifting a phase for shifting a  
17       phase of said local oscillation signal in response to said  
18       band switching signal to thereby supply the phase-shifted  
19       local oscillation signal to a second quadrature mixer for  
20       converting a transmission baseband signal into either the  
21       transmission signal or the transmission intermediate  
22       frequency signal.

1       **Claim 13 (previously presented):** A communication  
2       method of a multiband data communication apparatus  
3       including quadrature modulating means for converting a  
4       quadrature transmission baseband signal into either a  
5       transmission signal or a transmission intermediate  
6       frequency signal; and quadrature demodulating means for  
7       converting either a reception signal or a reception  
8       intermediate frequency signal into a quadrature reception  
9       baseband signal wherein said apparatus transmits and  
10       receives signals by switching a plurality of frequency  
11       bands in response to a band switching signal, said  
12       communication method comprising the steps of:

13       producing a local oscillation signal; and  
14       shifting a phase of said local oscillation signal in  
15       response to the band switching signal to thereby supply the  
16       phase-shifted local oscillation signal to one or both of a  
17       first quadrature mixer and a second quadrature mixer, said

18 first quadrature mixer converting either the reception  
19 signal or the reception intermediate frequency signal into  
20 a reception baseband signal, and said second quadrature  
21 mixer converting a transmission baseband signal into either  
22 the transmission signal or the transmission intermediate  
23 frequency signal.

1       **Claim 14 (previously presented):** A communication  
2 method of a multiband data communication apparatus as  
3 claimed in claim 13, wherein said phase shifting step  
4 includes:

5       a first supplying step for supplying a signal which is  
6 obtained by shifting the phase of said local oscillation  
7 signal by  $\pi/2$  to one of said first quadrature mixer and  
8 said second quadrature mixer;

9       an inverting step for inverting a code of said local  
10 oscillation signal; and

11       a second supplying step for supplying one of said  
12 local oscillation signal and the output signal of said  
13 inverting step to the other of said first quadrature mixer  
14 and said second quadrature mixer in response to said band  
15 switching signal.

1       **Claim 15 (previously presented):** A communication  
2 method of a multiband data communication apparatus as  
3 claimed in claim 13, wherein said phase shifting step  
4 includes:

5           a first supplying step for supplying said local  
6   oscillation signal to one of said first quadrature mixer  
7   and said second quadrature mixer;

8           a phase shifting step for shifting the phase of said  
9   local oscillation signal by  $\pi/2$ ;

10          an inverting step for inverting a code of said output  
11   signal of said phase shifting step; and

12          a second supplying step for supplying one of said  
13   output signal of said phase shifting step and the output  
14   signal of said inverting step to the other of said first  
15   quadrature mixer and said second quadrature mixer in  
16   response to said band switching signal.

1           **Claim 16 (previously presented):**   A communication  
2   method of a multiband data communication apparatus as  
3   claimed in claim 13, wherein said phase shifting step  
4   includes:

5           a first supplying step for supplying said local  
6   oscillation signal to one of said first quadrature mixer  
7   and said second quadrature mixer;

8           a phase delaying step for delaying the phase of said  
9   local oscillation signal by  $\pi/2$ ;

10          a phase advancing step for advancing the phase of said  
11   local oscillation signal by  $\pi/2$ ; and

12          a second supplying step for supplying one of the  
13   output signal of said phase delaying step and the output  
14   signal of said phase advancing step to the other of said

15 first quadrature mixer and said second quadrature mixer in  
16 response to said band switching signal.

1       **Claim 17 (previously presented):** A communication  
2 method of a multiband data communication apparatus  
3 including quadrature demodulating means for converting  
4 either a reception signal or a reception intermediate  
5 frequency signal into a quadrature reception baseband  
6 signal, for receiving by switching a plurality of frequency  
7 bands in response to a band switching signal, said  
8 communication method comprising:

9       a storing step for saving discrete data of a frequency  
10 pattern component functioning as a base;

11       an address generating step for generating an address  
12 every preselected clock signal;

13       a phase shifting step for adding a predetermined  
14 number based upon said band switching signal to said  
15 address;

16       a first analog converting step for analog-converting  
17 data which is read out by addressing said storing step  
18 based on the address outputted from said address generating  
19 step to thereby supply the analog-converted data to one of  
20 a pair of first quadrature mixers for converting either the  
21 reception signal or the reception intermediate frequency  
22 signal into a reception baseband signal; and

23       a second analog converting step for analog-converting  
24 data which is read out by addressing said storing step  
25 based on the output of said phase shifting step to thereby

26 supply the analog-converted data to the other of said first  
27 quadrature mixers.

1       **Claim 18 (previously presented):**   A communication  
2 method of a multiband data communication apparatus  
3 including quadrature modulating means for converting a  
4 quadrature transmission baseband signal into either a  
5 transmission signal or a transmission intermediate  
6 frequency signal, for transmitting by switching a plurality  
7 of frequency band in response to a band switching signal,  
8 said communication method comprising:

9       a storing step for saving discrete data of a frequency  
10 pattern component functioning as a base;

11       an address generating step for generating an address  
12 every preselected clock signal;

13       a phase shifting step for adding a predetermined  
14 number based upon said band switching signal to said  
15 address;

16       a first analog converting step for analog-converting  
17 data which is read out by addressing said storing step  
18 based on the address outputted from said address generating  
19 step to thereby supply the analog-converted data to one of  
20 a pair of second quadrature mixers for converting a  
21 transmission baseband signal into either the transmission  
22 signal or the transmission intermediate frequency signal;  
23 and

24       a second analog converting step for analog-converting  
25 data which is read out by addressing said storing step

26 based on the output of said phase shifting step to thereby  
27 supply the analog-converted data to the other of said  
28 second quadrature mixers.

1       **Claim 19 (previously presented):** A communication  
2 method of a multiband data communication apparatus  
3 including quadrature modulating means for converting a  
4 quadrature transmission baseband signal into either a  
5 transmission signal or a transmission intermediate  
6 frequency signal; and quadrature demodulating means for  
7 converting either a reception signal or a reception  
8 intermediate frequency signal into a quadrature reception  
9 baseband signal; and for transmitting/receiving by  
10 switching a plurality of frequency bands in response to a  
11 band switching signal, said communication method  
12 comprising:

13       a storing step for saving discrete data of a frequency  
14 pattern component functioning as a base;

15       an address generating step for generating an address  
16 every preselected clock signal;

17       a phase shifting step for adding a predetermined  
18 number based upon said band switching signal to said  
19 address;

20       a first analog converting step for analog-converting  
21 data which is read out by addressing said storing step  
22 based on the address outputted from said address generating  
23 step to thereby supply the analog-converted data to one of  
24 a first quadrature mixer and a second quadrature mixer,



25 said first quadrature mixer converting either the reception  
26 signal or the reception intermediate frequency signal into  
27 a reception baseband signal, and said second quadrature  
28 mixer converting a transmission baseband signal into either  
29 the transmission signal or the transmission intermediate  
30 frequency signal; and

31 a second analog converting step for analog-converting  
32 data which is read out by addressing said storing step  
33 based on the output of said phase shifting step to thereby  
34 supply the analog-converted data to the other of said first  
35 quadrature mixer and said second quadrature mixer.

1 **Claim 20 (original):** A storage medium for storing  
2 thereinto a computer readable program used to execute the  
3 communication method of the multiband data communication  
4 apparatus as recited in claim 11, 12, 13, 14, 15, 16, 17,  
5 18, or 19.

1 **Claim 21 (currently amended):** A multiband data  
2 communication apparatus which receives signals by switching  
3 a plurality of frequency bands in response to a band  
4 switching signal, said multiband data communication  
5 apparatus comprising:

6 quadrature demodulating means for converting either a  
7 reception signal or a reception intermediate frequency  
8 signal into a quadrature reception baseband signal, said  
9 quadrature demodulating means including:

10           a pair of first quadrature mixers for converting  
11   either the reception signal or the reception intermediate  
12   frequency signal into a reception baseband signal;

13           local oscillating means for producing a local  
14   oscillation signal;

15           phase shifting means for shifting a phase of said  
16   local oscillation signal for input to one of said pair of  
17   first quadrature mixers without regard to said band  
18   switching signal; and

19           means for optionally changing a phase of said local  
20   oscillation signal for input to another of said pair of  
21   first quadrature mixers based upon said band switching  
22   signal to thereby ensure correct polarities of quadrature  
23   components of said reception baseband signal.

1           **Claim 22 (previously presented):** A multiband data  
2   communication apparatus which receives signals by switching  
3   a plurality of frequency bands in response to a band  
4   switching signal, said multiband data communication  
5   apparatus comprising:

6           quadrature demodulating means for converting either a  
7   reception signal or a reception intermediate frequency  
8   signal into a quadrature reception baseband signal, said  
9   quadrature demodulating means including:

10           a pair of first quadrature mixers for converting  
11   either the reception signal or the reception intermediate  
12   frequency signal into a reception baseband signal;

13           local oscillating means for producing a local  
14 oscillation signal; and

15           phase shifting means for inputting said band switching  
16 signal for shifting a phase of said local oscillation  
17 signal to ensure consistent polarities of quadrature  
18 components of said reception baseband signal irrespective  
19 of an operating band of the apparatus.

1           **Claim 23 (previously presented):** A multiband data  
2 communication apparatus as claimed in claim 1, wherein said  
3 phase shifting means supplies a signal obtained by shifting  
4 the phase of said local oscillation signal by  $\pi/2$  to one of  
5 said pair of first quadrature mixers, while said phase  
6 shifting means supplies one of said local oscillation  
7 signal and a signal obtained by inverting a code of said  
8 local oscillation signal to the other of said pair of first  
9 quadrature mixers in response to said band switching  
10 signal.

1           **Claim 24 (previously presented):** A multiband data  
2 communication apparatus as claimed in claim 1, wherein said  
3 phase shifting means supplies said local oscillation signal  
4 to one of said pair of first quadrature mixers while said  
5 phase shifting means supplies one of a signal obtained by  
6 shifting the phase of said local oscillation signal by  $\pi/2$   
7 and a signal obtained by shifting the phase of said local  
8 oscillation signal by  $\pi/2$  and then inverting said phase-  
9 shifted local oscillation signal to the other mixer of said

10 pair of first quadrature mixers in response to said band  
11 switching signal.

1       **Claim 25 (previously presented):** A multiband data  
2 communication apparatus as claimed in claim 1, wherein said  
3 phase shifting means supplies said local oscillation signal  
4 to one of said pair of first quadrature mixers, while said  
5 phase shifting means supplies one of a signal obtained by  
6 delaying the phase of said local oscillation signal by  $\pi/2$   
7 and a signal obtained by advancing the phase of said local  
8 oscillation signal by  $\pi/2$  to the other of said pair of  
9 first quadrature mixers in response to said band switching  
10 signal.

1       **Claim 26 (previously presented):** A multiband data  
2 communication apparatus as claimed in claim 2, wherein said  
3 phase shifting means supplies a signal obtained by shifting  
4 the phase of said local oscillation signal by  $\pi/2$  to one of  
5 said pair of second quadrature mixers, while said phase  
6 shifting means supplies one of said local oscillation  
7 signal and a signal obtained by inverting a code of said  
8 local oscillation signal to the other of said pair of  
9 second quadrature mixers in response to said band switching  
10 signal.

1       **Claim 27 (previously presented):** A multiband data  
2 communication apparatus as claimed in claim 2, wherein said  
3 phase shifting means supplies said local oscillation signal

4 to one of said pair of second quadrature mixers while said  
5 phase shifting means supplies one of a signal obtained by  
6 shifting the phase of said local oscillation signal by  $\pi/2$   
7 and a signal obtained by shifting the phase of said local  
8 oscillation signal by  $\pi/2$  and then inverting said phase-  
9 shifted local oscillation signal to the other mixer of said  
10 pair of second quadrature mixers in response to said band  
11 switching signal.

1 **Claim 28 (previously presented):** A multiband data  
2 communication apparatus as claimed in claim 2, wherein said  
3 phase shifting means supplies said local oscillation signal  
4 to one of said pair of second quadrature mixers, while said  
5 phase shifting means supplies one of a signal obtained by  
6 delaying the phase of said local oscillation signal by  $\pi/2$   
7 and a signal obtained by advancing the phase of said local  
8 oscillation signal by  $\pi/2$  to the other of said pair of  
9 second quadrature mixers in response to said band switching  
10 signal.

1 **Claim 29 (previously presented):** A multiband data  
2 communication apparatus as claimed in claim 7, wherein  
3 either said quadrature demodulating means includes clock  
4 generating means for generating a clock signal and interval  
5 determining means for determining a clock interval used to  
6 read out data from said storage means so as to control the  
7 address generating operation of said address generating  
8 means.

1           **Claim 30 (previously presented):** A multiband data  
2   communication apparatus as claimed in claim 8, wherein  
3   either said quadrature modulating means includes clock  
4   generating means for generating a clock signal and interval  
5   determining means for determining a clock interval used to  
6   read out data from said storage means so as to control the  
7   address generating operation of said address generating  
8   means.